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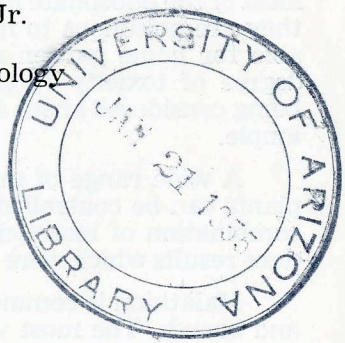

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MALATHION FOR THE CONTROL OF PESTS ON ORNAMENTALS IN SOUTHERN ARIZONA: A PROGRESS REPORT

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This is a progress report summarizing observations made during 1954 on the use of malathion for the control of the following pests affecting ornamental plants in Southern Arizona:

mites on pyracantha
mites on Italian cypress
mites on roses
springtails in lawns and homes
leafhoppers on lawns
aphids on pittosporum
aphids on arborvitae
bagworms on eucalyptus
leaf skeletonizers on grapes

Malathion is the approved common name for O, O-dimethyl dithiophosphate of diethyl mercaptosuccinate, an insecticide effective against a wide range of pests but relatively non-poisonous (non-toxic) to warm-blooded animals. It is stable when stored, compatible with most of the commonly used insecticides and fungicides and is not toxic to plants at concentrations recommended for insect control.

Malathion belongs to the group of materials known as "phosphate insecticides," which includes parathion, demeton and TEPP. Most of the phosphate insecticides require special handling because they are poisonous to human beings and, therefore, are not suitable for home garden use. Malathion, however, has a very low degree of toxicity (poisoning effect) to warm-blooded animals, being considered about eight times safer, orally, than DDT, for example.

A wide range of mites and insects which attack ornamental plants can be controlled very effectively with malathion where a combination of insecticides had previously been required to produce results which were often far less satisfactory.

Malathion is commonly available in a variety of formulations and brands. The most widely used formulation for insect control on ornamental plantings is an emulsifiable concentrate containing 50 per cent malathion. This is generally referred to as "50 per cent emulsifiable concentrate." Dusts containing 4 or 5 per cent malathion may also be available, as well as malathion-fungicide dust combinations in dispenser packages. The use of sprayers which attach to a garden hose is rapidly gaining in popularity. This affords an inexpensive, easy and effective method of applying malathion emulsifiable sprays, although it may not be possible to maintain a completely uniform concentration of insec-

ticide. Hand-operated, tank-type sprayers as well as conventional power sprayers are also very useful in applying malathion to ornamental plantings.

SPIDER MITES ON PYRACANTHA

Spider mites **(Paratetranychus platani McG.)** damage many pyracanthia leaves each year in Southern Arizona. The mites often go unnoticed by the average homeowner until the damage has already been done. The mites remove the chlorophyll from the leaves, which then become bronzed in appearance. Often there is a considerable amount of white webbing, both on the upper and lower sides of the leaves, which becomes coated with dust and dirt, adding to the unsightly appearance of the bushes.

In the past, dusting with sulfur or washing the bushes with a hose have been used in attempts to reduce mite populations, sometimes with little or no success.

Seasonal abundance of mites on pyracantha.

Two series of counts of mite populations were made on untreated pyracantha bushes on the University of Arizona campus during the spring of 1954. (Second series of counts made on bushes somewhat unlike the first in immediate environment.)

First series:

Date	Number of mites on twenty-five leaves
March 18	157
March 25	181
April 2	253
April 8	445
April 23	208
May 20	3

Second series:

Date	Number of mites on twenty-five leaves
March 12	524
March 19	376
March 25	323
April 2	642
April 8	913

The mites were numerous early in March on overwintering pyracantha leaves. Mite populations increased rapidly during early April, when the typical bronzing symptoms became apparent on the new foliage. (Sometimes leaves went from green to bronze in less than one week.) The mite increase closely followed the blooming cycle of the plants, as the mites transferred from the old to the new leaves during the bud stage and multiplied during the period of full bloom. Leaf injury became most apparent as the petals fell.

Control of mites on pyracantha with malathion.

On March 13, a large pyracantha was thoroughly sprayed with malathion at the rate of 1½ pints of 50-per cent emulsifiable concentrate per 100 gallons of water, using a 50-gallon power sprayer. A second application was made on April 10. No pre-count of the mites was obtained but at the start of the experiment the treated and untreated bushes, which were about 15 feet apart, appeared to have similar mite populations.

Date	Number of mites per twenty-five leaves	
	Untreated	Treated
March 18	44	0
March 25	13	0
April 8	148	19
April 22	567	0
May 19	20	0

During April and May the treated bush was lush and green while the leaves of the untreated bush were rusty-brown and covered with a dusty webbing.

From 1954 observations it is concluded that mites on pyracantha may be effectively controlled in the spring with two applications of malathion at 1½ pints of emulsifiable concentrate (50 per cent malathion) per 100 gallons of water. The first application should be made when the buds begin to form, or just as the young new leaves appear, which usually is early in March. This application is to control the mites which are present on the old leaves. Treatment of the bushes during the blooming period should be avoided to prevent killing honeybees. A second application of malathion should be made following the period of bloom to kill any mites that may be on the new leaves.

SPIDER MITES ON ITALIAN CYPRESS

Injury to Italian cypress takes place in the spring and fall when spider mites of the species **Paratetranychus ununguis** (Jac.) become abundant and produce a webbing over the twigs. Dust and dirt particles adhere to the webbing, causing the trees to appear dusty-brown.

On March 13, 1954, four Italian cypress trees were thoroughly sprayed with a single application of malathion at the rate of 1½ pints of 50 per cent malathion emulsion per 100 gallons of water using a 50-gallon power sprayer. Counts of mite populations were made on 10 terminal twigs of uniform size taken from each tree.

Date	Number of mites per forty terminals	
	Untreated	Treated
March 18	389	0
April 1	315	0
April 16	742	3
April 28	736	80
May 19	129	29

At the time of the first count on March 18, no mites were observed on the treated trees. Cool, wet weather during the following week reduced the mite population on the untreated trees 20 per cent by April 1. On April 16 the population on the untreated trees was almost twice that observed on March 18 and many eggs were present.

Virtually complete control of the mites on the sprayed trees continued on April 16. Mites began to appear on sprayed trees by

April 28, but soon afterward populations on both treated and untreated trees began to decrease. Thrips, believed to be the six-spotted thrips, **Scolothrips sexmaculatus** (Pergande), were abundant on the unsprayed trees but their role as mite predators was not determined.

SPIDER MITES ON ROSES

Two spotted spider mites, **Tetranychus bimaculatus** Harvey, are serious pests of roses in Southern Arizona. As with other ornamentals, their injury is characterized by the bronzing and webbing of the leaves. Following severe infestation the leaves become dusty, slate-grey in color.

In the spring of 1954, a row of climbing roses was observed to have a severe mite infestation, so noticeable as to be visible from passing automobiles. The infestation was undoubtedly accentuated by the dust from a recently resurfaced adjacent road. The bushes were sprayed with a 3-gallon hand sprayer, at the rate of 1½ pints of 50 per cent malathion emulsifiable concentrate per 100 gallons of water. The treatment appeared to kill all the mites.

SPRINGTAILS IN LAWNS AND HOMES

As far as is known, springtails (Order: Collembola) do not damage commercial crops in Arizona. Their presence is often a nuisance during the spring and summer months when they may appear in large numbers on windowsills, floors, and bathtubs in homes. Because of their tremendous numbers, housewives, in addition to detesting their presence, have become concerned that these tiny insects may damage household articles or garden plants.

Early in April, 1954, springtails became very numerous in the Bermuda grass, on the fiber carpeting, and on the surface of standing water at a miniature golf course in Tucson.

During the heat of mid-day most of the insects were in the thick Bermuda grass turf. On April 1, malathion was sprayed on four plots of Bermuda grass, each approximately 1½ to 2 square yards in area, using a 3-gallon tank sprayer with a cone nozzle. An 80 per cent malathion emulsifiable concentrate was used and 4.5 ml. in one gallon of water treated approximately 7 to 8 square yards.

On April 3, sixty-one springtails were counted in the untreated grass plots and seven in the treated plots. All of the latter were found adjacent to the untreated plots. Counts of springtails in the grass bordering the sidewalks indicated 263 in the untreated plots and only 1 in the treated plots. It appears obvious that populations of springtails can be effectively reduced in Bermuda grass turf with malathion sprays.

A further test was made on April 20 outside a home where springtails were very abundant inside the house, on outside brick walls, on sidewalks and in the grass and flower beds.

The entire lawn area and the outside walls of the house were sprayed with a garden hose applicator using malathion at the rate of 1 tablespoon of emulsifiable concentrate (80 per cent malathion) per 3 gallons of water. The next day it was reported that scarcely a springtail could be found outside of the house although two days passed before springtails disappeared from inside the house.

LEAFHOPPERS ON LAWNS

Various species of leafhoppers are often very abundant on lawns in Southern Arizona. As they fly up from the grass they are unsightly as well as annoying, particularly if the area is used for recreation or social activities. At night, the leafhoppers are attracted to lights in annoying clouds.

On May 10, 1954, the 3,000 square feet of Bermuda grass turf in a Tucson yard was sprayed with malathion. Two tablespoons of 80 per cent emulsifiable malathion in six gallons of water was applied thru a garden hose insecticide sprayer. This amount covered a lawn area of approximately 3,000 square feet at a rate equivalent to approximately 1½ pints of 50 per cent emulsifiable malathion per 100 gallons of water, or approximately 1 tablespoon of 50 per cent emulsifiable malathion per 1,000 square feet of turf.

Immediately prior to the May 10 spraying, 1,160 leafhoppers were caught in twenty sweeps of an insect net. On May 11 the area was again swept and only three leafhoppers were caught in twenty sweeps, indicating an excellent kill of the leafhoppers.

APHIDS ON ARBORVITAE

Small brown aphids of the species **Cinara tujafilina** DelG. often become abundant on arborvitae in the spring. These aphids cluster inconspicuously between the leaflets, suck the sap, and secrete honeydew which glistens on the trees, discolors the ground or sidewalk below, attracts bees and wasps, and soon becomes covered with a brown fungus.

On March 13, 1954, four trees on the University of Arizona campus were thoroughly sprayed with malathion at the rate of 1½ pints of 50 per cent emulsifiable concentrate per 100 gallons of water, using a 50-gallon power sprayer. A second application at the same rate was made on April 10, but to only two of the trees previously treated. Counts of aphids were made by examining infestations on terminal twigs of approximately equal size.

	Number of aphids per 100 terminals		
Date	one application	two applications	untreated
March 11	...	..	676
March 16	8	..	906
March 26	1	..	1066
April 1	79	..	1145
April 8	331	..	886
April 14	488	..	788
April 22	350	..	294
April 28	360	4	208

The first application of malathion eliminated most of the aphids for approximately three weeks, during which there was a considerable amount of cool wet weather. Winged females began to settle on the treated trees and to produce colonies of aphids which built up soon after the first of April. At the same time the population on the untreated trees began to decline.

Infestations on treated trees were again eliminated when a second application was made. The control of aphids on arborvitae with malathion sprays appeared both effective and practical.

APHIDS ON PITTOSPORUM

Colonies of the bean aphid, **Aphis fabae** Scopoli, feeding on the under sides of pittosporum foliage produce copious amounts of unsightly honeydew and cause the leaves to curl.

On March 13, 1954, a pittosporum hedge in Tucson was thoroughly sprayed with malathion at the rate of 1½ pints of 50 per cent emulsifiable concentrate per 100 gallons of water using a 50-gallon power sprayer. Aphid populations were measured on different dates by counting the number of individuals on 100 leaves.

	Number of aphids per 100 leaves	
Date	Untreated	Treated
March 11	512	728
March 16	797	4
March 25	961	3
April 1	1769	27
April 8	2583	270
April 14	1654	336
April 22	1475	152
April 28	473	42

The malathion spray gave effective aphid control during a three-week period when a portion of the weather was cool and wet. After April 1 the terminals and small leaves had become reinfested with winged aphids and by April 8 populations had developed on the larger leaves.

Aphid populations on unsprayed plants declined in mid-April as hymenopterous parasites and syrphid fly larva predators became numerous. During the previous month, however, these untreated plants were very unsightly from the copious honeydew and curled leaves. Malathion was considered satisfactory for controlling aphids on pittosporum although better control would have resulted in 1954 had a second application been made two or three weeks after the first.

BAGWORNS ON EUCALYPTUS

Bagworms (**Oiketicus** sp.) are common pests of ornamental trees such as eucalyptus, Chinese elm and arborvitae in Southern

Arizona. In the fall of 1953 a particularly heavy infestation of bagworms was observed on eucalyptus in Tucson. The feeding of the larvae had caused severe defoliation of the trees. These trees were sprayed with malathion at the rate of approximately 2 pints of 50 per cent emulsifiable malathion per 100 gallons of water using a 50-gallon power sprayer. Several days later a virtually complete kill of the bagworm larvae was observed. Malathion was considered a satisfactory control for these insects.

WESTERN GRAPE LEAF SKELETONIZER ON GRAPES

During the summer, larvae of the Western grape leaf skeletonizer (**Harrisina brillians** B. & McD.) may cause extensive injury to grape leaves within a very short time. The recommended treatment has been 50 per cent cryolite dust applied to the under sides of the leaves. This dust is sometimes difficult to obtain in small quantities and often has not given satisfactory control.

In August, 1954, an ornamental grape vine infested with larvae of the Western grape leaf skeletonizer was sprayed with malathion at the rate of 1½ pints of emulsifiable concentrate per 100 gallons of water. An insecticide sprayer hose attachment was used and the leaves were thoroughly sprayed on their top and bottom surfaces. The vines were examined two days later. All of the larvae had been killed. Thorough coverage of grape foliage with malathion spray gave effective control of the Western grape leaf skeletonizer.